

CLAIMS

What is claimed is:

- 1 1. An apparatus, comprising:
2 a band having a top surface, a bottom surface, an inner diameter surface
3 and an outer diameter surface, the outer diameter surface having one or more clamp
4 structures disposed thereon to couple the band to a disk, each of the one or more clamp
5 structures radially extended away from the outer diameter surface of the band, and the
6 inner diameter surface having a plurality of protuberances disposed thereon.
- 1 2. The apparatus of claim 1, wherein the band establishes a center of rotation for the
2 disk coincident with a mass center of the disk.
- 1 3. The apparatus of claim 1, further comprising a plurality of outer protuberances
2 disposed on the outer diameter surface of the band.
- 1 4. The apparatus of claim 1, wherein each of the one or more clamp structures
2 comprises a flange pair extending from the top surface and the bottom surface towards
3 the outer diameter surface of the band.
- 1 5. The apparatus of claim 1, wherein each of the plurality of protuberances
2 comprises a loop.

1 6. The apparatus of claim 5, wherein the band comprises a plurality of hinges to
2 adjust the band.

1 7. The apparatus of claim 1, further comprising a plurality of pins, each of the
2 plurality of pins circumferentially disposed within the band, and each of the one or more
3 clamp structures flexible about the plurality of pins.

1 8. The apparatus of claim 1, wherein each of the one or more clamp structures is
2 hingedly coupled to the band.

1 9. The apparatus of claim 1, wherein each of the one or more clamp structures has a
2 circumferential groove on the outer diameter surface to mate the band to the disk.

1 10. An apparatus, comprising:
2 a disk having an inner diameter surface;
3 a band having a top surface, a bottom surface, an inner diameter surface
4 and an outer diameter surface;
5 one or more clamp structures disposed on the band, the one or more clamp
6 structures to couple the band to the disk; and
7 a plurality of protuberances disposed on the inner diameter surface of the
8 band.

1 11. The apparatus of claim 10, wherein the band is a balance ring for the disk.

1 12. The apparatus of claim 10, further comprising a plurality of outer protuberances
2 disposed on the outer diameter surface of the band.

1 13. The apparatus of claim 10, wherein each of the one or more clamp structures
2 comprises a flange extended from the top and bottom surfaces towards the outer diameter
3 of the band.

1 14. The apparatus of claim 10, wherein each of the plurality of protuberances
2 comprises a loop.

1 15. The apparatus of claim 14, wherein the band comprises a plurality of hinges to
2 adjust the band.

1 16. The apparatus of claim 10, further comprising a plurality of pins, each of the
2 plurality of pins circumferentially disposed within the band, and each of the one or more
3 clamp structures flexible about the plurality of pins.

1 17. The apparatus of claim 10, wherein each of the one or more clamp structures is
2 hingedly coupled to the band.

1 18. The apparatus of claim 10, wherein each of the one or more clamp structures has a
2 circumferential groove on the outer diameter to mate the band to the inner diameter of the
3 disk.

1 19. A disk drive, comprising:

2 a spindle;

3 a disk having an inner diameter; and

4 a band having a top surface, a bottom surface, an inner diameter surface
5 and an outer diameter surface, the band comprising:

6 one or more clamp structures disposed on the outer diameter
7 surface of the band, each of the one or more clamp structures to couple the
8 band to the disk; and

9 a plurality of protuberances disposed on the inner diameter surface
10 of the band, and the plurality of protuberances coupled to the spindle.

1 20. The apparatus of claim 19, wherein the band establishes a center of rotation for
2 the disk coincident with a mass center of the disk.

1 21. The apparatus of claim 19, wherein each of the plurality of protuberances
2 comprises a semi-elliptical node.

1 22. The apparatus of claim 19, wherein each of the one or more clamp structures
2 comprises a flange extended from the top surface and the bottom surface towards the
3 outer diameter of the band.

1 23. The apparatus of claim 19, wherein each of the plurality of protuberances
2 comprises a loop.

1 24. The apparatus of claim 23, wherein the band has a plurality of hinges to adjust the
2 band.

1 25. The apparatus of claim 19, further comprising a plurality of pins, each of the
2 plurality of pins circumferentially disposed within the band, and each of the clamp
3 structures flexible about the pins.

1 26. The apparatus of claim 19, wherein each of the one or more clamp structures is
2 hingedly coupled to the band.

1 27. The apparatus of claim 19, wherein each of the one or more clamp structures has a
2 circumferential groove on the outer diameter surface to secure the band to the disk.

1 28. An apparatus, comprising:
2 a disk securing mechanism to secure a disk coupled with a balance ring,
3 the balance ring having a plurality of protuberances;

4 a spindle to rotate the disk coupled with the balance ring;
5 a controller to determine a mass center of the rotated disk coupled with the
6 balance ring; and
7 a trimmer operable to trim the plurality of protuberances of the balance
8 ring based on the determined mass center.

1 29. The apparatus of claim 28, wherein the trimmed plurality of protuberances
2 establish a new center of rotation coincident with the mass center.

1 30. The apparatus of claim 28, wherein the trimmer comprises an optical trimmer.

1 31. The apparatus of claim 30, wherein the trimmer comprises a laser source.

1 32. The apparatus of claim 28, wherein the trimmer comprises a mechanical grinder.

1 33. The apparatus of claim 28, wherein the trimmer thermally ablates the
2 protuberances on the balance ring.

1 34. A method, comprising:

2 coupling a band to a disk, the disk having a mass center and a rotational
3 center, the band comprising a plurality of protuberances;
4 rotating the disk to identify the mass center for the disk; and

5 trimming the plurality of protuberance of band to establish a new
6 rotational center of the coupled disk and band coincident with the mass center of
7 the disk.

1 35. The method of claim 34, further comprising mounting the coupled band and disk
2 on a disk drive spindle.

1 36. The method of claim 34, wherein coupling to the band to the disk comprises
2 clamping an outer diameter surface of the band to the disk.

1 37. The method of claim 35, wherein identifying comprises;
2 transmitting information about the mass center to a controller; and
3 rotating the disk to a horizontal azimuth with the mass center on the
4 horizontal azimuth using the controller.

1 38. The method of claim 37, wherein trimming further comprises positioning a
2 trimmer opposite a planar surface of the disk, the trimmer moveable along an axis
3 parallel to the horizontal azimuth with the mass center on the disk, and the trimmer
4 targeting the plurality of protuberances on the band.

1 39. The method of claim 34, wherein trimming comprises removing a portion of the
2 plurality of protuberances using a laser.

1 40. The method of claim 34, wherein trimming comprises thermally ablating a portion
2 of the plurality of protuberances.

1 41. The method of claim 34, wherein trimming comprises mechanically grinding a
2 portion of the plurality of protuberances.